VIEW POINT

The Public Health Implications of the Detection of Polio Virus in Gazan Sewage

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ABSTRACT

Recently, poliovirus was detected in a sewage sample in Gaza in July 2024. Given the country's ongoing armed conflict, this situation is a double-edged sword, as thousands of residents are already displaced, living in temporary camps with a high risk of polio transmission that could lead to paralysis and disability. The re-emergence of polio after 25 years of being polio-free disrupts normal life and worsens both physical and mental health conditions among the Gazan population. This article examines the public health implications of this crisis, focusing on health system collapse, inadequate immunisation coverage, deteriorating living and environmental conditions, and proposes context-specific strategies to strengthen immunisation, community engagement, disease surveillance, and the integration of mental health services, while addressing the humanitarian crisis.

Keywords: Conflict zone, Gaza, Health system, Humanitarian crisis, Polio, Surveillance

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INTRODUCTION

The World Health Organization reported that poliovirus was detected in environmental samples from Khan Younis and Deir al-Balah of the Gaza Strip in July 2024.[1] Following this, on 16th August, health officials from Palestine confirmed the first case of polio in an unvaccinated 10-month-old girl after 25 years in Deir al-Balah, Gaza.[2] The reemergence of polio, after being proclaimed eradicated in 1999, is a direct result of the protracted conflict that has devastated the nation's healthcare system. This scenario unequivocally illustrates how violence can undermine decades of public health progress and poses a significant obstacle to the WHO's "zero polio" target in the Eastern Mediterranean region.[3,4] Inevitably, this could also present an important public health concern in neighbouring regions and even further afield, given the communicable nature of the disease.

Recent public health history reveals that humanitarian crises have facilitated the spread of polio in several areas. For instance, the polio outbreak in 2017 in conflict-ridden Syria resulted in 74 children becoming paralysed. Moreover, the longest continuous chain of variant poliovirus transmission in the world since 2017 in Somalia is a consequence of a ten-year civil conflict in the country.[5] It is noteworthy that Somalia has reported no polio since 2014, and the African continent was declared polio-free in 2020. Despite this, polio strains continue to threaten the children in Somalia, where the health system has been devastated due to violence, poverty, and climate change.[5,6]

The collapse of sanitation, water, and health infrastructure in Gaza results from a combination of prolonged armed conflict, governance and resource-management challenges, misuse of civilian infrastructure by multiple parties, and severe restrictions on the movement of goods and personnel. These interrelated factors have collectively undermined routine immunisation services and environmental surveillance.

Together, these systemic failures create conditions in which infectious diseases and other health conditions can resurface. We believe that the resurgence of the polio virus in Gaza is not a standalone epidemiological event rather a manifestation of a multitude of issues, such as system collapse, poor immunisation coverage, declining living and environmental conditions, with cascading effects on both physical and mental health of the Gazan population. The subsequent sections of this viewpoint are built on this central argument.

RESURGENCE OF THE POLIO VIRUS AND ITS HEALTH SYSTEM IMPLICATIONS

Recent detection of wild polio cases in countries such as Gaza, Mozambique, and Malawi, along with additional identification of the virus in sewage samples in the US and the UK, has raised significant concerns within the global health community. Such incidents heighten the risk of the resurgence of Polio in other geographies and demonstrate how tenuous the gains made in the decades-long fight against polio are.[7] As of 2nd April 2025, as reported by the World Health Organisation, from an estimated 350,000 cases in more than 125 endemic nations, wild poliovirus-related cases have decreased by nearly 99% since 1988 to two endemic countries.[8] This decrease in the number of wild polio cases is a testament to significant public health achievements in the recent past. This achievement came in handy as a result of the dexterity that the countries showed in terms of extensive community engagement, rigorous monitoring, and extensive vaccination campaigns despite the major challenges of a large and diverse population, a few and sporadic instances of vaccine hesitancy and logistical problems.[9,10]

What is significant at this point is that, given numerous cases of resurgence around the world, polio could resurface at any time. The virus was found in sewage samples in the US and the UK, highlighting the ongoing risks to areas that have been free of polio for many years.[7]

For several polio-free countries, the polio outbreak in other regions of the world has significant repercussions. Despite being polio-free for several years, these nations may be in danger of becoming complacent. In addition to maintaining a high vaccination rate and vigilant monitoring, the government must pay particular attention to underprivileged regions where a possible resurgence may occur. Given the experience of vaccine fatigue concerning COVID-19 vaccination, it becomes imperative to keep people informed and combat vaccine hesitancy.[11]

Furthermore, it is crucial to maintain a robust routine immunisation regimen to prevent the virus from returning. It is a stark reminder of the detrimental repercussions of political instability, inadequate health systems, and inequities in vaccination, which lead to increased polio detections in conflict-ridden regions. Adequate funding and a renewed focus on international cooperation are required to address these challenges. International organisations like the Global Polio Eradication Initiative (GPEI) play a pivotal role in mobilising resources and funding the polio eradication efforts.[12] Moreover, cooperation between donor and recipient nations, along with strong political will, is essential to drive these efforts. A strong and continued commitment is required at the global level to overcome logistical challenges and ensure that every child receives life-saving vaccinations.

THE PSYCHOLOGICAL DISTRESS

Given the country's ongoing armed conflict, this situation is a double-edged sword. This situation exacerbates the psychological distress as thousands of resi-

dents are already conflict-ridden and put up in temporary camps where there are high chances of transmission of Polio that may cause paralysis and disability. Armed conflicts have a substantial impact on the mental health of the affected population. Traumatic experiences, including loss and injury, along with socio-economic factors such as displacement and loss of income, are significant contributors.[13] One of the studies assessed the psychological impact of the ongoing armed conflict on Palestinians residing in the Gaza Strip. Of the 339 young adults surveyed between the ages of 18 and 24, 97.05%, 84.37%, and 90.56% reported moderate or higher levels of depression, anxiety, and stress; 63.40% experienced Post Traumatic Stress Disorder (PTSD) symptoms.[14]

Although not directly linked, the detection of the polio virus acts as an additional stressor to the existing psychological distress among the Gaza population. Furthermore, the dire living conditions that include overcrowding in displaced shelters, damaged sanitation infrastructure, further aggravate the condition.[15,16] The persistent uncertainties and lack of control over the situation can further heighten the anxiety and mental health challenges of the Gaza population.[17] Many children are becoming predisposed to anxiety, depression, post-traumatic stress disorder (PTSD), and other adverse mental health conditions due to incessant exposure to trauma, displacement, and the loss of family members. A 2020 survey indicated that 53.5% of youngsters in Gaza experienced PTSD before this conflict.[18] The incompetence of health experts, a scarcity of mental health care providers, and restrictions on international aid result in numerous cases remaining unaddressed.[19] Consequently, numerous youngsters do not receive the necessary treatment, jeopardising their education, social integration, and future employment, thereby perpetuating a cycle of social instability. Extremist organisations frequently take advantage of hopelessness; thus, the resulting psychological suffering can make young people and children more vulnerable to radicalisation.[19]

INTERSECTING PHYSICAL VULNERABILITIES AND PSYCHOLOGICAL DISTRESS

According to a WHO report, thousands of people have been killed and injured, and many are expected to be missing in the country. The current health system is severely overwhelmed by cases of severe acute diarrhoeal disease, acute respiratory infections, hepatitis A, and increasing food insecurity. This situation makes children particularly vulnerable to Polio.[5] According to a commentary by the Director General-WHO, before the armed conflict, 99% of children were vaccinated.[5] That now puts 86%, which is concerning since it creates areas of unvaccinated children where the virus may spread.[5] Overcrowding, increased temperatures, the imminent failure of the healthcare system, restricted access to potable water and sanitary facilities, and heightened vulnerabilities, including injuries and compromised immunity, are facilitating the proliferation of vaccine-preventable and skin diseases.[16] Additionally, the WHO and Save the Children have warned that diseases may cause a higher mortality rate than the conflict itself. Following the resumption of hostilities after a brief ceasefire, there has been a notable rise in infectious diseases.[20] The ongoing conflict has disrupted childhood vaccination programmes, hindered disease surveillance systems, damaged water and sanitation infrastructure, and reduced access to treatment, collectively increasing the vulnerability of children to communicable diseases.[21] The extensive damage to Gaza's health infrastructure is likely to lead to increased child morbidity and mortality beyond the current period of active hostilities.[20] Conflict greatly impacts children's development throughout their lives.[22] Extensive research has established a link between adverse childhood experiences, such as exposure to abuse and violence, and lifelong health issues, including chronic diseases and psychological disorders.[23]

VACCINE HESITANCY AND RISK COMMUNICATION CHALLENGES

Hesitancy regarding COVID-19 vaccination presents significant challenges in regions characterised by low literacy and the rapid dissemination of conspiracy theories.[24] Two rounds of surveys conducted in Gaza, in 2021 and 2023, indicated that over 30% of respondents exhibited hesitancy toward receiving COVID-19 vaccinations, with rates of 31.7% in 2023 and 34.1% in 2021. Persistent concerns regarding the safety of the COVID-19 vaccine continued to contribute to vaccine hesitancy and were prevalent among unvaccinated individuals in the Gaza Strip.[25] Such scepticism compromises attempt to reach high vaccination coverage, including the polio vaccination.[26]

INTEGRATED RESPONSE STRATEGY

It is further paramount to understand how to integrate the polio vaccination with other health services, which is an accepted strategy to ensure better coverage and prevent the risk of resurgence in future. The lessons learnt from the successful vaccination campaigns of COVID-19 and the strategies to overcome vaccine hesitancy can be used to improve vaccination and surveillance systems. Most importantly, Strategies including collaborations with local leaders, customised messaging, and the incorporation of digital tools are vital for addressing vaccine hesitancy.[26] The recent detection of polio in the Middle East underscores the critical need to consider local context in the global campaign to eradicate polio. This scenario highlights the importance of engaging all health stakeholders at local, regional, and global levels in the implementation of sustainable immunisation initiatives.[27] We propose the following

three important strategies to address this crisis in Gaza.

Renewed focus on the immunisation services: A mass vaccination program, scheduled from 22 to 26 February 2025, is being implemented to combat the polio outbreak in the Gaza Strip, following the detection of the poliovirus. The novel oral polio vaccine type 2 (nOPV2) is intended for administration to about 591,000 children under the age of 10 to avert polio.[28] Gaza faces particular obstacles for immunisation, not exclusive to the region, concerning the safety of healthcare workers, which is severely compromised due to safety concerns for vaccination teams and sites that jeopardise their lives and the efficacy of the campaigns. Logistical issues like maintaining a cold chain add more complexity to the eradication effort.[27] Effective preventive responses necessitate legal protections for individuals seeking vaccination and health care resources, ongoing international support, culturally appropriate public health communication, community involvement, and the resilience and preparedness of health systems during periods of peace and recovery. Long-term investments and technological and scientific innovations are crucial for maintaining a modest service like the Expanded Program on Immunisation (EPI) in the context of prolonged conflicts.[29]

Risk communication and community engagement: Experiences from the COVID-19 vaccination using risk communication and community engagement (RCCE) can be leveraged to improve the polio vaccination in Gaza. The RCCE can help strengthen trust in vaccination. Without clear communication, rumours about the dangers of vaccination, distrust of the immunisation program, and refusal or hesitancy to get vaccinated might develop. Ineffective communication regarding vaccination can lead to major reputation problems for immunisation programs and the health system as a whole, lower vaccine acceptance and uptake, and higher VPD epidemic risk among under-immunised population groups.[30]

Humanitarian support: Strengthening humanitarian support can significantly enhance immunisation coverage in Gaza.[21,31] Through coordinated, multisectoral efforts involving international organisations such as the World Health Organisation (WHO), the United Nations Children's Fund (UNICEF), the United Nations Relief and Works Agency for Palestine Refugees (UNRWA), and other partners, large-scale, targeted immunisation campaigns should be conducted. Mobile teams can be mobilised for the displaced and conflict-affected population while ensuring the uninterrupted supply of vaccines and consumables.[32]

Conclusion

The resurgence of the polio virus in the already conflict-ridden Gaza has significant public health implications for both the physical and mental health of the Gazan population. It is a manifestation of deep structural vulnerabilities that is represented by intersecting crises of poor immunisation coverage, limited disease surveillance and declining living and environmental conditions that increased the polio transmission and complicated the outbreak response, adding to the existing mental health issues of the families affected by the prolonged conflict. International cooperation, renewed focus on immunisation, humanitarian support, funding, counselling services and integration of both physical and mental health are the need of the hour to address the ongoing malady in Gaza.

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